

## METEOROLOGY OF MOUNT KOSCIUSCO.

BY R. VON LENDENFELD, PH.D.

During my recent expedition to the central part of the Australian Alps, I made some observations of interest regarding the Meteorology of that part of our colony.

In a recent map showing the quantity of rain in various parts of New South Wales and Victoria, published in Victoria, it is stated that there is *less rain* on Mount Kosciusco than either north or south-west. This is a statement contradictory to alpine experience and it is partly to show the fallacy of it, that I have written this paper.

The nearest meteorological station is Kiandra and more rain falls there during *every* season than during the corresponding lapse of time in any other station in New South Wales or Victoria.

On approaching the mountain one immediately perceives that there must be plenty of water there as the rivers which drain the mountain are large and full even in a time of drought.

Coming down the mountain I measured the Snowy River above its junction with the Crackenback and found that over 2,300 cubic feet of water passed there per minute, at a height of 2,952 per feet. When the river is high this amount is greatly increased ; then the stream conveys at that point about 1,000,000 feet of water down the valley per minute. This river drains an area of about 500 square miles and so it is quite clear that that area cannot be suffering much from drought.

This area forms the main part of the Kosciusco-plateau extending 40 miles north of Mount Townsend.

The valleys on this plateau through which the tributaries of the Snowy River flow are so wet and boggy that it is with great difficulty that one can get along through them. On the plateau

itself there is an abundance of beautiful clear rivulets, each strong enough to turn a mill. Most of these arise from the bogs in the valleys, some originate in lakes. There are no springs. The amount of water which comes from the melting of the snow-fields during the dry season is very small.

The extensive melting of the snow in spring makes the rivers rise at that time of the year.

All these facts show plainly that there must be a very great amount of aqueous precipitation there during the year, and I do not think that I am far out in estimating it at 100 inches to 120 inches per annum.

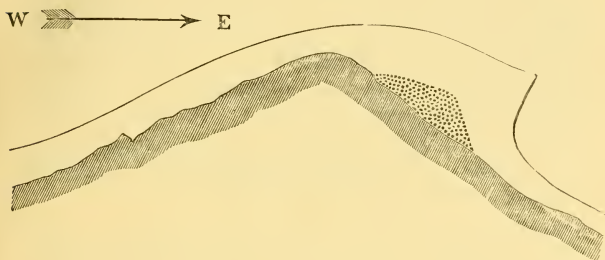
All this water comes down in three different shapes :—  
1 as rain ; 2 as snow or hail, and 3 as dew.

The rain is not always a pronounced downpour, but often nothing else than a precipitation of mist. The amount of water precipitated from mist without the formation of regular rain in the mountains is much greater than one generally assumes. I have frequently seen in Europe the water run down the roofs of the Chateaux de Chasse or the shepherd's huts in the mountains in a fog without rain, just as rapidly as if it were actually raining. As the Surveyor-General informs me, there is a similar kind of precipitation sometimes met with also on the Kosciusco plateau. From this wet fog to actual rain there is every transition form of precipitation, depending entirely on the height of the clouds. If the clouds hang on the mountain, then there is no rain, if they are high the rain is pronounced.

I have made extensive inquiries as to the amount of rain of the old residents in the district, and found that they all agree in saying, when it rains below it invariably rains or snows above ; and that it also rains or snows above however, often when it is fine below.

The snow falls all the year round in heights above 5,500 feet on the Kosciusco plateau. For eight months in the year it probably never rains on the highest elevations. In midsummer, however, there is rain also there in the warm weather. The snow lies on the greater part of the plateau from 5 to 8 months in the year

according to the height. There is no spot however, where the fall of snow in winter and spring exceeds the amount melted during summer and autumn. Consequently, the snow lies only there, where it has been piled up by wind in snowdrifts. The remnants of such drifts last through the summer. They appear as bands often interrupted, following the ridges about 20 feet below the summit, and 30 to 50 feet broad on the southern and eastern slopes, as stripes and patches in a line parallel to the summit line, fringing the upper margin of the south-eastern slopes. Such little snowdrift patches are met with in all suitable places above 6,500 feet.



Similar snow patches formed in a homologous manner are formed everywhere, where the mountains attain a sufficient height. They form the most striking peculiarity of those mountains in the European Alps, which attain a height of about 9,000 feet. There such eternal snow patches are, however, not found below 8000 feet. These alps lie in lat.  $47^{\circ}$  N. If we compare this with the fact that on Kosciusco homologous snow patches are found in  $37^{\circ}$  S. and 1,500 feet lower, we must come to the conclusion that also in Australia, as in New Zealand and Patagonia, it is either colder or damper or both than in the northern hemisphere at corresponding latitudes. The snow patches come down to about 6500 feet in Europe in lat.  $52^{\circ}$ , that is 15 degrees further

away from the equator than Mount Kosciusco. This result is only in so far interesting, as it shows that Australia, with its hot and dry continental climate, is no exception to the rule of the greater amount of cold and wet in the Southern Hemisphere.

Perhaps the most important of the aqueous precipitation is the dew. I have never in any part of the world at any height between 1000 and 15,000 feet experienced such dews as every night at our camp on the Kosciusco plateau. The whole plateau covered by a thinner layer of air than the low lands around, is of course subject to very extensive radiation during the night and gets so cold towards the morning that it freezes there above 5,500 feet nearly every clear night in the year. During our stay in the middle of January it was very warm in the day but invariably froze at night.

The sea breeze coming up of an evening to replace the heated air in the centre of the Australian continent is comparatively warm and saturated with moisture.

It blows up the eastern slopes of the plateau and encounters its ice cold surface. It can easily be understood how an exceptional amount of dew is precipitated in consequence.

This dew freezes and fresh dew is deposited on the ice. In this way a coating of ice, about a sixteenth of an inch thick, was formed on our tin plates which I left outside the tent over night for the purpose of ascertaining the amount of dew.

Our tent was frozen as hard as a weatherboard cottage every morning and could not be packed until the rising sun had melted the ice attached to it.

It will appear from these statements that as one might *a priori* expect, the Kosciusco plateau is blessed with a great amount of aqueous precipitation and that the abundance of crystal clear water in the streams draining it can easily be accounted for.

I should like to add a few remarks concerning the exceptionally wet weather we have had the last few days, namely, from January the 17th to the 25th. On the morning of January 11th, when we

were in Bett's Camp nearly 6,000 feet high, I observed the formation of high clouds in the S.E., and their approach towards the N.W., subsequently they vanished. There is no surer sign of continuous and extensive rain approaching than that.

On that day and the following, it was very fine, and also the morning of the 13th was cloudless in the mountains. The next was fairly fine in the morning. There were very high clouds all over the sky. This together with the foregoing observations, enabled me by my old alpine experience to foretell a regular extensive rain, which also set in. It is of course, not here to decide how often a mistake would be made by a forecast of this kind; but two conclusions can at all events be drawn from the fact, that I did foretell the rain. Firstly, that European experience also holds good in Australia; and secondly, that no place is so well adapted for the erection of a meteorological station as these high mountains, as one is nowhere else in so good a position to make a forecast as there; where in consequence of the elevation, one is nearer the clouds, and in most cases probably close to the place—on the main dividing range, where the rain is brewed.